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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,002	08/17/2004	Shih-Chang Shei	12278-US-PA	5001

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JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER	
RAABE, CHRISTOPHER M	
ART UNIT	**PAPER NUMBER**
2879	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/711,002	SHEI ET AL.	
	Examiner	Art Unit	
	Christopher M. Raabe	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-25, 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakano et al. (USPN 2003/0080341).

With regard top claim 1,

Sakano et al. disclose a white light light emitting diode (LED), comprising: an exciting light source, for emitting a light, wherein a wavelength of the light is in a range of about 250 nm to about 490 nm (paragraph 95); and a fluorescent powder, disposed around the exciting light source, for absorbing the light emitting from the exciting light source, wherein a material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:Tb^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Mn^{2+}$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$,$(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, $Mg_3SiO_4:Mn$, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu^{2+},Gd^{2+}$ (paragraph 212).

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With regard to claim 2,

Sakano et al. disclose the white light LED of claim 1, wherein when the wavelength of the light is in a range of about 440 nm to about 490 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$, $(Me_{1-x-}$

$_yEu_xRe_y)_3SiO_5$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-}$ $_xEu_x)ReS$, $6MgO,As_2O_5:Mn$ and $Mg_3SiO_4:Mn$ (paragraph 212).

With regard to claim 3,

Sakano et al. disclose the white light LED of claim 1, wherein when the wavelength of the light is in a range of about 250 nm to about 440 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$, $(Me_{1-x-}$ $_yEu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:TB^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Mn^{2+}$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^3$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$,$(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, $Mg_3SiO_4:Mn$, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu-^{2+},Gd^{2+}$ (paragraph 212).

With regard to claim 4,

Sakano et al. disclose the white light LED of claim 1, wherein $0<x\leq0.8$ and $0\leq y\leq2.0$ (paragraph 212).

With regard to claim 5,

Sakano et al. disclose the white light LED of claim 1, wherein Me comprises calcium, strontium, or barium (paragraph 212).

With regard to claim 6,

Sakano et al. disclose the white light LED of claim 1, wherein Re comprises praseodymium (Pr), rubidium, samarium (Sm), dysprosium (Dy), holmium (Ho), yttrium, erbium

(Er), europium (Eu), thulium (Tm), ytterbium (Yb), chromium, strontium, lutetium (Lu), gadolinium (Gd), aluminum, or zinc (paragraph 212).

With regard to claim 7,

Sakano et al. disclose the white light LED of claim 1, wherein the exciting light source comprises LED chip or laser diode chip (paragraph 95).

With regard to claim 8,

Sakano et al. disclose a white light light emitting diode (LED), comprising: a susceptor, having a pit in a surface of the susceptor (101,102 of fig 5); an exciting light source, disposed in the pit of the susceptor and electrically connected to the susceptor (5 of fig 5), wherein a light having a wavelength in a range of about 250 nm to about 490 nm is emitted from the exciting light source (paragraph 95); a sealing resin, disposed over the susceptor, wherein the exciting light source is covered by the sealing resin to mount the exciting light source over the susceptor (8 of fig 5); and a fluorescent powder, disposed in the sealing resin, and for receiving the light emitting from the exciting light source, wherein a material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O1_2$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:TB^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Mn^{2+}$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, $Mg_3SiO_4:Mn$, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu^{2+},Gd^{2+}$ (paragraph 212).

With regard to claim 9,

Sakano et al. disclose the white light LED of claim 8, further comprising: a plurality of welding wire, electrically connected between the exciting light source and the susceptor (7 of fig 1).

With regard to claim 10,

Sakano et al. disclose the white light LED of claim 8, wherein the susceptor comprises a packaging leadframe or a circuit board (2 of fig 1).

With regard to claim 11,

Sakano et al. disclose the white light LED of claim 8, wherein the exciting light source comprises a LED chip or a laser diode chip (paragraph 95).

With regard to claim 12,

Sakano et al. disclose the white light LED of claim 8, wherein when the wavelength of the light is in a range of about 440 nm to about 490 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O1_2$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, and $Mg_3SiO_4:Mn$ (paragraph 212).

With regard to claim 13,

Sakano et al. disclose the white light LED of claim 8, wherein when the wavelength of the light is in a range of about 250 nm to about 440 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O1_2$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:TB^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$,

$(Ba,Sr)MgAl_{10}O_{17}:Mn^{2+}$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, $Mg_3SiO_4:Mn$, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu-^{2+},Gd^{2+}$ (paragraph 212).

With regard to claim 14,

Sakano et al. disclose the white light LED of claim 8, wherein $0<x\leq0.8$, and $0\leq y\leq.2.0$ (paragraph 212).

With regard to claim 15,

Sakano et al. disclose the white light LED of claim 8, wherein Me comprises calcium, strontium, or barium (paragraph 212).

With regard to claim 16,

Sakano et al. disclose the white light LED of claim 8, wherein Re comprises praseodymium (Pr), rubidium, samarium (Sm), dysprosium (Dy), holmium (Ho), yttrium, erbium (Er), europium (Eu), thulium (Tm), ytterbium (Yb), chromium, strontium, lutetium (Lu), gadolinium (Gd), aluminum, or zinc (paragraph 212).

17. A white light light emitting diode (LED), at least comprising: a LED chip, for emitting a light having a wavelength in a range of about 250 nm to about 490 nm, wherein the LED chip comprising: a substrate; an nucleation layer, disposed over the substrate; a conductive buffer layer, disposed over the nucleation layer; a first confinement layer, disposed over the conductive buffer layer, wherein a type of a (conductive) doping material of the first confinement layer and a type of a (conductive) doping material of the conductive buffer layer

are the same; a light emitting layer, disposed over the first confinement layer, wherein the light emitting layer comprises doped III-V compound semiconductor material; a second confinement layer, disposed over the light emitting layer, wherein a type of the (conductive) doping material of the second confinement layer and the type of the (conductive) doping material of the first confinement layer are different; a contact layer, disposed over the second confinement layer, wherein the contact layer comprises a superlattice structure material layer; an anode electrode, disposed over the contact layer; a cathode electrode, contacted to the conductive buffer layer, and isolated from the first and the second confinement layer, the light emitting layer, the contact layer and the anode electrode (paragraphs 91-96); and a fluorescent powder, disposed around the exciting light source, and for receiving the light emitting from the exciting light source, wherein a material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:TB^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Mn^{2+}$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$, $Mg_3SiO_4:Mn$, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu^{2+},Gd^{2+}$ (paragraph 212)

With regard to claim 18.

Sakano et al. disclose the white light LED of claim 17, wherein when a wavelength of the light is in a range of about 440 nm to about 490 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$, $(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O:Eu^{3+}$, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5:Mn$ and $Mg_3SiO_4:Mn$ (paragraph 212).

With regard to claim 19,

Sakano et al. disclose the white light LED of claim 17, wherein when the wavelength of the light is in a range of about 250 nm to about 440 nm (paragraph 95), the material of the fluorescent powder is selected from a group consisting of $(Tb_{3-x-y}Ce_xRe_y)Al_5O_{12}$,$(Me_{1-x-y}Eu_xRe_y)_3SiO_5$, $YBO_3:Ce^{3+}$, $YBO_3:TB^{3+}$, $SrGa_2O_4:Eu^{2+}$, $SrAl_2O_4:Eu^{2+}$, $(Ba,Sr)MgAl_{10}O_{17}:Eu^{2+}$, (Ba,Sr)MgAl10O17:Mn.sup.2- +, $Y_2O_3:Eu^{3+}$, $Y_2O_3:Bi^{3+}$, $(Y,Gd)_2O_3$:Eu.sup.3, $(Y,Gd)_2O_3:Bi^{3+}$, $Y_2O_2S:Eu^{3+}$, $Y_2O_2S:Bi^{3+}$, $(Me_{1-x}Eu_x)ReS$, $6MgO,As_2O_5$:Mn, Mg_3SiO_4:Mn, $BaMgAl_{10}O_{17}:Eu^{2+}$ and $(Ca,Sr,Ba)_5(PO_4)_3Cl:Eu^{2+},Gd^{2+}$ (paragraph 212)

With regard to claim 20,

Sakano et al. disclose the white light LED of claim 17, wherein $0<x\leq0.8$ and $0\leq y\leq2.0$ (paragraph 212).

With regard to claim 21,

Sakano et al disclose the white light LED of claim 17, wherein Me comprises calcium, strontium or barium (paragraph 212).

With regard to claim 22,

Sakano et al. disclose the white light LED of claim 17, wherein Re comprises praseodymium (Pr), rubidium, samarium (Sm), dysprosium (Dy), holmium (Ho), yttrium, erbium (Er), europium (Eu), thulium (Tm), ytterbium (Yb), chromium, strontium, lutetium (Lu), gadolinium (Gd), aluminum or zinc (paragraph 212).

With regard to claim 23,

Sakano et al. disclose the white light LED of claim 17, wherein a super high conductivity material of the contact layer comprises strained layer superlattice (SLS) material (paragraph 92).

With regard to claim 24,

Sakano et al. disclose the white light LED of claim 23, wherein a conductive type of the contact layer and a conductive type of the second confinement layer are different (paragraphs 91-96).

With regard to claim 25,

Sakano et al. disclose the white light LED of claim 23, wherein a conductive type of the contact layer and a conductive type of the anode electrode are different (paragraphs 91-96).

With regard to claim 28,

Sakano et al. disclose the white light LED, wherein the substrate is comprised aluminum oxide, sapphire, silcon carbide (SiC), zinc oxide (ZnO), silicon substrate, gallium phosphide (GaP) or gallium arsenide (GaAs) (paragraph 92).

With regard to claim 29,

Sakano et al. disclose the white light LED of claim 17, wherein the light emitting layer comprises a doped III-V compound semiconductor quantum well structure. (paragraph 277)

With regard to claim 30,

Sakano et al. disclose the white light LED of claim 29, wherein the quantum well structure comprises doped III-V compound semiconductor comprising $Al_aIn_bGa_{1-a-b}N/Al_xIn_yGa_{1-x-y}N$, wherein $a,b\geq 0$; $0\leq a+b<1$; $x,y\geq 0$; $0\leq x+y<1$; $x>c>a$ (paragraph 253).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 26,27,31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakano et al. as applied to claim 17 above, and further in view of Kuo et al. (USPN 2002/0096687).

With regard to claim 26,

Sakano discloses the white light LED of claim 17.

Sakano does not describe the anode in detail.

Kuo et al. do disclose an anode electrode comprising a conventional metal used in a semiconductor process and a multi-layer structure composed of a mixture of the conventional metal, wherein a total thickness of the anode electrode is equal to or less than 0.1 μm (paragraph 33), providing greater light emission.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the anode of Kuo et al. into the device of Sakano in order to provide greater light emission.

With regard to claim 27,

Sakano et al. disclose the white light LED.

Sakano does not describe the anode in detail.

Kuo et al do disclose the anode electrode comprising a transparent conductive oxide (TCO), wherein the TCO comprises a N-type conductive material comprising indium tin oxide (ITO), cadmium tin oxide (CTO), ZnO:Al, ZnO:In, ZnO:Ga, $ZnGa_2O_4$, SnO_2:Sb, Ga_2O_3:Sn, $AgInO_2$:Sn and In_2O_3:Zn, or a P-type conductive material comprising $CuAlO_2$, LaCuOS, NiO, $CuGaO_2$ and $SrCu_2O_2$ (paragraph 33), providing greater light emission.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the anode of Kuo et al. into the device of Sakano in order to provide greater light emission.

With regard to claim 31,

Sakano et al. disclose the white light LED of claim 17.

Sakano et al. do not describe the cathode in detail.

Kuo et al. do disclose an LED wherein the cathode electrode comprises Cr/Au, Cr/Pt/Au, Cr/WSiN/Au, WSi_x/Au, Ti/Si_x/Au, Ti/Au, Ti/WSi_x/Au, Ti/Al/Cr/Au, Ti/Al/Co/Au, Cr/Al/Cr/Au, Cr/Al/Pt/Au, Cr/Al/Pd/Au, Cr/Al/Ti/Au, Cr/Al/Co/Au, Cr/Al/Ni/Au, Pd/Al/Ti/Au, Pd/Al/Pt/Au, Pd/Al/Ni/Au, Pd/Al/Pd/Au, Pd/Al/Cr/Au, Pd/Al/Co/Au, Nd/Al/Pt/Au, Nd/Al/Ti/Au, Nd/Al/Ni/Au, Nd/Al/Cr/Au Nd/Al/Co/A, Hf/Al/Ti/Au, Hf/Al/Pt/Au, Hf/Al/Ni/Au, Hf/Al/Pd/Au, Hf/Al/Cr/Au, Hf/Al/Co/Au, Zr/Al/Ti/Au, Zr/Al/Pt/Au, Zr/Al/Ni/Au, Zr/Al/Pd/Au, Zr/Al/Cr/Au, Zr/Al/Co/Au, TiNx/Ti/Au, TiNx/Pt/Au, TiNx/Ni/Au, TiNx/Pd/Au, TiNx/Cr/Au, TiNx/Co/Au TiWNx/Ti/Au, TiWNx/Pt/Au, TiWNx/Ni/Au, TiWNx/Pd/Au, Ti-WNx/Cr/Au, TiWNx/Co/Au, NiAl/Pt/Au, NiAl/Cr/Au, NiAl/Ni/Au, NiAl/Ti/Au, Ti/NiAl/Pt/Au, Ti/NiAl/Ti/Au, Ti/NiAl/Ni/Au or Ti/NiAl/Cr/Au (paragraph 28), providing smaller contact resistance.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the cathode of Kuo et al. into the device of Sakano et al. in order to provide smaller contact resistance.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPN 6121638, 4774205, 2001/0008484, 59998925.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Raabe whose telephone number is 571-272-8434. The examiner can normally be reached on m-f 7am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CR

ASHOK PATEL
PRIMARY EXAMINER